	No.1410B	Monolithic Digital IC
		<b>LB1403N SERIES</b>
<b>5-Dot Red/Green LED Level Meter</b>		

**Use**

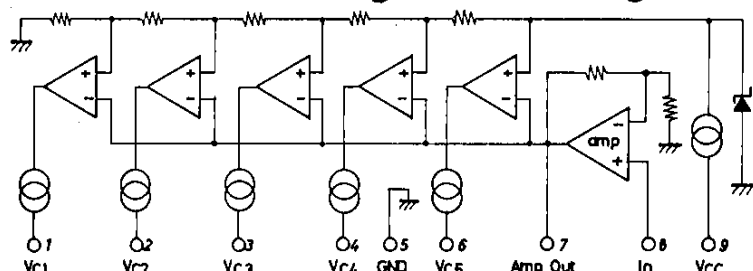
- . AC level meters such as VU meters.
- . DC level meters such as signal meters.

**Features and Functions**

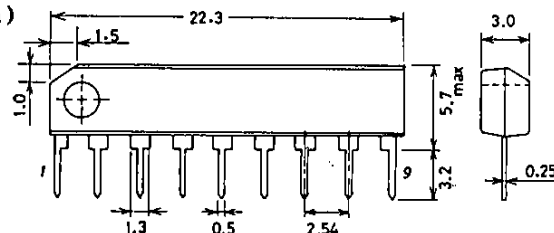
- . Capable of generating a bar-display for input voltage with 5 LEDs.
- . Operates from either AC or DC input voltage because of on-chip rectifier amplifier.
- . Lighting levels remain stable to line regulation because of on-chip voltage reference.
- . LEDs are driven by a constant current ; stable to line regulation.
- . Power supply voltage range is wide (3.5 to 16V), for a wide range of applications.
- . Five types of ICs constitute the series with various lighting levels of the LEDs and driving currents.
- . SEP-9 pin package and fewer externally connected components result in smaller space requirements on the circuit board.
- . Low noise at LED lighted mode

**LB1403N Series**

Type No.	V <sub>C3</sub> lighting sensitivity	Comparator level	Constant LED current
LB1403N	85 mVrms typ	+6dB,+3dB,0dB,-5dB,-10dB	15 mA typ
LB1413N	105 mVrms typ	1.67V <sub>C3</sub> ,1.33V <sub>C3</sub> ,V <sub>C3</sub> ,0.67V <sub>C3</sub> ,0.33V <sub>C3</sub>	15 mA typ
LB1423N	85 mVrms typ	+6dB,+3dB,0dB,-5dB,-10dB	7 mA typ
LB1433N	105 mVrms typ	1.67V <sub>C3</sub> ,1.33V <sub>C3</sub> ,V <sub>C3</sub> ,0.67V <sub>C3</sub> ,0.33V <sub>C3</sub>	7 mA typ
LB1443N	85 mVrms typ	+6dB,+3dB,0dB,-6dB,-12dB	15 mA typ

**Equivalent Circuit Block Diagram and Pin Assignment**

**Package Dimensions 3017B-S9IC**  
(unit: mm)



SANYO: SEP9

**SANYO Electric Co., Ltd. Semiconductor Business Headquarters**  
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

7227KI/8225MW/2284KI, TS No. 1410-1/4

## LB1403N,1413N,1423N,1433N,1443N

**Absolute Maximum Ratings**[LB1403N,1413N,1423N,1433N,1443N] at Ta=25°C unit

Maximum Supply Voltage	V <sub>CC</sub> max	18	V
Allowable Power Dissipation	P <sub>d</sub> max	1100	mW
Operating Temperature	T <sub>opr</sub>	-25 to +75	°C
Storage Temperature	T <sub>stg</sub>	-55 to +125	°C

**Allowable Operating Conditions**[LB1403N,1413N,1423N,1433N,1443N] at Ta=25°C

Supply Voltage	V <sub>CC</sub>	min	typ	max	unit
		3.5	6	16	V

<b>Electrical Characteristics</b> [LB1403N] at Ta=25°C, V <sub>CC</sub> =6V, f=1kHz					
		min	typ	max	unit
Current Dissipation	I <sub>CC</sub> V <sub>IN</sub> =0		5	8	mA
Sensitivity	V <sub>IN</sub> Vc3 on-level	74	85	96	mVrms
Comparator Level 1	Vc1	-11.5	-10	-8.5	dB
Comparator Level 2	Vc2	-6	-5	-4	dB
Comparator Level 3	Vc3 Point of adjustment		0		dB
Comparator Level 4	Vc4	2.5	3	3.5	dB
Comparator Level 5	Vc5	5	6	7	dB
LED Constant Current	I <sub>LED</sub>	11	15	18.5	mA
Input Bias Current	I <sub>INO</sub>	-1.0	-0.3		μA

<b>Electrical Characteristics</b> [LB1413N] at Ta=25°C, V <sub>CC</sub> =6V, f=1kHz					
		min	typ	max	unit
Current Dissipation	I <sub>CC</sub> V <sub>IN</sub> =0		5	8	mA
Sensitivity	V <sub>IN</sub> Vc3 on-level	91	105	119	mVrms
Comparator Level 1	Vc1	0.28	0.33	0.40	mVrms
		·Vc3	·Vc3	·Vc3	
Comparator Level 2	Vc2	0.59	0.67	0.75	mVrms
		·Vc3	·Vc3	·Vc3	
Comparator Level 3	Vc3 Point of adjustment		VIN		mVrms
Comparator Level 4	Vc4	1.25	1.33	1.42	mVrms
		·Vc3	·Vc3	·Vc3	
Comparator Level 5	Vc5	1.48	1.67	1.87	mVrms
		·Vc3	·Vc3	·Vc3	
LED Constant Current	I <sub>LED</sub>	11	15	18.5	mA
Input Bias Current	I <sub>INO</sub>	-1.0	-0.3		μA

<b>Electrical Characteristics</b> [LB1423N] at Ta=25°C, V <sub>CC</sub> =6V, f=1kHz					
		min	typ	max	unit
Current Dissipation	I <sub>CC</sub> V <sub>IN</sub> =0		5	8	mA
Sensitivity	V <sub>IN</sub> Vc3 on-level	74	85	96	mVrms
Comparator Level 1	Vc1	-11.5	-10	-8.5	dB
Comparator Level 2	Vc2	-6	-5	-4	dB
Comparator Level 3	Vc3 Point of adjustment		0		dB
Comparator Level 4	Vc4	2.5	3	3.5	dB
Comparator Level 5	Vc5	5	6	7	dB
LED Constant Current	I <sub>LED</sub>	5	7	9.5	mA
Input Bias Current	I <sub>INO</sub>	-1.0	-0.3		μA

<b>Electrical Characteristics</b> [LB1433N] at Ta=25°C, V <sub>CC</sub> =6V, f=1kHz					
		min	typ	max	unit
Current Dissipation	I <sub>CC</sub> V <sub>IN</sub> =0		5	8	mA
Sensitivity	V <sub>IN</sub> Vc3 on-level	91	105	119	mVrms
Comparator Level 1	Vc1	0.28	0.33	0.40	mVrms
		·Vc3	·Vc3	·Vc3	
Comparator Level 2	Vc2	0.59	0.67	0.75	mVrms
		·Vc3	·Vc3	·Vc3	
Comparator Level 3	Vc3 Point of adjustment		VIN		mVrms

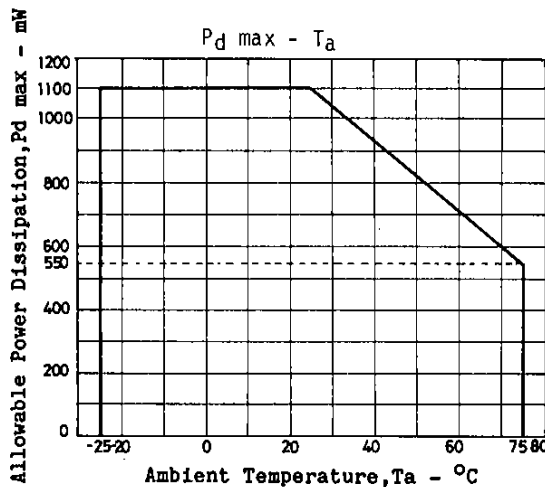
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## LB1403N, 1413N, 1423N, 1433N, 1443N

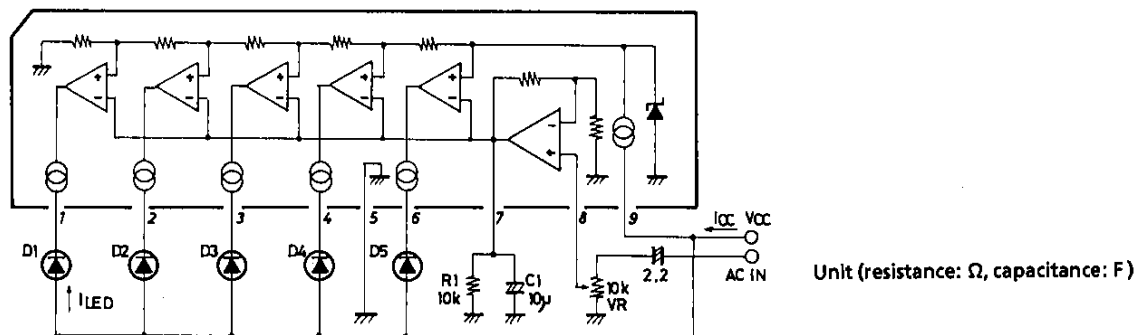
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		min	typ	max	unit
Comparator Level 4	Vc4	1.25	1.33	1.42	mVrms
		-Vc3	-Vc3	-Vc3	
Comparator Level 5	Vc5	1.48	1.67	1.87	mVrms
		-Vc3	-Vc3	-Vc3	
LED Constant Current	$I_{LED}$	5	7	9.5	mA
Input Bias Current	$I_{INO}$	-1.0	-0.3		$\mu A$

Electrical Characteristics [LB1443N] at $T_a = 25^\circ C, V_{CC} = 6V, f = 1kHz$		min	typ	max	unit
Current Dissipation	$I_{CC}$ $V_{IN} = 0$		5	8	mA
Sensitivity	$V_{IN}$ $V_{c3}$ on-level	74	85	96	mVrms
Comparator Level 1	Vc1	-14	-12	-10	dB
Comparator Level 2	Vc2	-7	-6	-5	dB
Comparator Level 3	Vc3	Point of adjustment		0	dB
Comparator Level 4	Vc4	2.5	3	3.5	dB
Comparator Level 5	Vc5	5	6	7	dB
LED Constant Current	$I_{LED}$	11	15	18.5	mA
Input Bias Current	$I_{INO}$	-1.0	-0.3		$\mu A$



## Sample Application Circuit and Test Circuit (AC input VU meter)



\* Capacitor to be omitted when used as a DC-input signal meter.

- $C_1, R_1$  time constant:  
The response time can be varied by varying the  $C_1, R_1$  time constant (mainly the  $C_1$  value).

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## LB1403N, 1413N, 1423N, 1433N, 1443N

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When the  $C_1$ ,  $R_1$  time constant is larger:

..... The response time (attack time and release time) is made slower.

When the  $C_1$ ,  $R_1$  time constant is smaller:

..... The response time (attack time and release time) is made faster.

• Considerations relative to  $P_d$  max of the package:

Due to the constant current  $I_{LED}$ , most of the power consumed by the circuits is consumed within the IC.

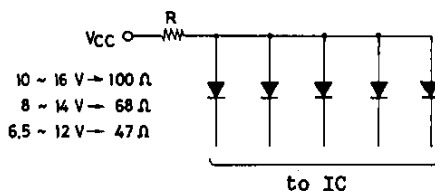
When lighting the five LEDs continuously for a prolonged length of time, make sure that  $V_{CC}$  does not exceed:

LB1403N, 1413N, 1443N  $V_{CC}=9V$

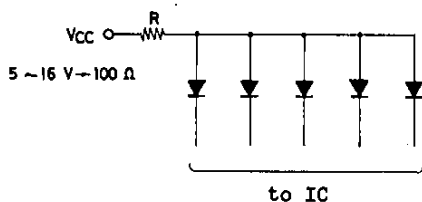
LB1423N, 1433N  $V_{CC}=14V$

When using a higher power supply voltage, insert a resistor in series with the LEDs to restrain the power consumed within the IC package.

For LB1403N, 1413N, 1443N:



For LB1423N, 1433N:



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